Grades
3rd to 5th

Lesson 2: Milk Quality & Safety: Keeping Milk Fresh

Lesson Introduction

How does milk get from the cow to the consumer? Students will learn the steps taken to make sure milk is safe and a quality food from the time it leaves the cow to when it is bought in the store to when they drink it or eat foods made with it. The lesson will also highlight the career of being a milk inspector.

Lesson Objectives

- Students will define pasteurization.
- Students will explain the steps taken to ensure milk goes from cow to consumer safely and is a quality food.
- Students will list the skills, education, and responsibilities of being a milk inspector.
- Students will explain how fat molecules change in milk.

Time: 45 – 60 minutes

Standards: See the Discover Dairy website for complete listing by grade level.

Vocabulary

- Inspector, milk tank, milking equipment, pasteurization, processing plant, sanitize, teats, and udder

Materials Needed

- Computer
- Lesson Presentation: PowerPoint, Canva
- Multimedia Projector and Screen
- Color Explosion Lab Materials
- Writing Prompts
- Internet Access
- Pencils
- Discover Dairy and Milk Safety Video
- Ag Careers USDA Milk Inspector Video
- USDA Milk Inspector Career Spotlight

Activities

- Milk Quality and Safety Video Discussion Guide Fill in the Blank and Answer Key
- Milk Quality and Safety Video Discussion Guide Without Word Bank
- Keep It Fresh eBook
- USDA Milk Inspector Career Spotlight Video and Outline
- Color Explosion Lab with Directions, Lab Sheets, and Answer Key
- Writing Prompt with Drawing Option
- Writing Prompt without Drawing and PDF Fillable Version
- Dairy Word Search & Dairy Product ID
- Kahoot! Game
- Quizziz Activity
- Quizlet Set

Procedure

Introduction (10 minutes)

- Go over the essential vocabulary terms and their meanings for this lesson. Use Lesson 2 PowerPoint slides 2-3 for the introduction and vocabulary.
- **Activating Strategy:** Let's discover how milk is kept clean and safe from when it leaves the cow to when we drink it by watching the video, **Discover Dairy and Milk Safety**.

Steps to Keeping Milk Fresh and Safe (8-15 minutes)

- Introduction
- Discuss the Steps to Keeping Milk Fresh and Safe using slides 5-14. Students can also read the Keeping It Fresh eBook together or on their own to learn the same information.
- Closure: We discussed how dairy farmers and others do many things to make sure the milk we drink is fresh and safe. However, once we get it home, it is up to us to keep milk safe and pure. Tell us how you can do your job to make sure milk is safe.

Career Spotlight: Milk Inspector (6 minutes)

- Introduction, slide 15
- Facilitate the Career Spotlight on Milk Inspectors using the Ag Careers USDA Milk Inspector video and discussion of responsibilities and education.
- Share the USDA Milk Inspector Career Spotlight worksheet with the students. Use slides 16-19 to guide the conversation.
- Closure: Milk inspectors are needed to make sure that milk and dairy foods are safe and quality foods to drink and eat.
  - Tell us one way that milk inspectors make sure our milk is fresh and safe.
  - Are you interested in being a milk inspector when you grow up?

Summative Activity (30 minutes)

- Introduction, slides 20-22
- Pass out the Color Explosion Lab Directions and Lab Sheet to students.
- Allow students class time to complete the lab.
- Walk around, offering help and answering questions as needed.
- **Lesson Closure:** Today you learned about the journey of milk from the cow to you and what important steps are taken by farmers, inspectors, processors, and even us to make sure milk and dairy foods are fresh and safe. Tell us one thing you learned today about "Keeping Milk Fresh."

Extension Activities (10-15 minutes)

- Other activities that can be used instead of or in addition to the above activities are:
  - Writing Prompts
  - Quizziz Activity
  - Quizlet Set
  - Kahoot! Game
  - Dairy Word Search & Dairy Product ID

Career Spotlight

Milk Inspector

Summative Assessment

Students will complete the Color Explosion Lab Sheet with a mastery level of 80% or higher.

Grades
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Lesson 2 Milk Quality & Safety
Vocabulary Word Definitions

Inspector: a person who checks dairy barns, cows, and equipment to make sure they are kept clean and safe.

Milk Tank: a special container where milk is cooled to under 40°F and stored until picked up and taken to the processing plant.

Milking Equipment: the unit used to gently remove the milk from the cow's udder.

Pasteurization: the process of heating milk to at least 145°F for a short period of time which makes sure milk and dairy foods are safe to drink and eat.

Processing Plant: the place where milk is pasteurized and bottled for fluid milk or made into dairy foods.

Sanitize: To clean something making sure any dirt or harmful deposits are removed.

Teats: the projections on the bottom of the udder with openings for the milk to leave the udder.

Udder: the part of a cow's body which makes and holds milk

Name: _____ **Date:** _____

Discover Dairy and Milk Quality & Safety
Video Discussion Guide

Directions: Fill in the blanks as you watch the "Discover Dairy and Milk Quality and Safety" video.

1. First, _____ really care about their cows

2. The whole milking process takes place using modern _____ without human _____ ever touching the milk.

3. Everything is sanitized which means keeping things clean so people can stay _____.

4. Plate coolers quickly _____ the milk.

5. Milk is stored in the milk tank at _____ degrees until it leaves the farm.

6. Before a farm's milk goes into the truck, the driver _____ and labels the milk.

7. Pasteurization _____ any microorganisms like bacteria, so dairy products are both healthy and pure.

8. Milk is shipped in refrigerated trucks no more than _____ miles away.

9. Our job is the three C's, keep milk _____, _____, and _____.

Name: _____ **Date:** _____

Discover Dairy and Milk Quality & Safety
Video Discussion Guide

Directions: Use the correct number or word from the bank to complete the sentences you watch "Discover Dairy and Milk Quality and Safety" video.

40	**100**	**Clean**	**Cold**	**Cool**	**Covered**
Farmers	**Hands**	**Healthy**	**Kills**	**Machines**	**Tests**

1. First, _____ really care about their cows

2. The whole milking process takes place using modern _____ without human _____ ever touching the milk.

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Name: _____ **Date:** _____

Discover Dairy and Milk Quality & Safety
Video Discussion Guide

Directions: Use the correct number or word from the bank to complete the sentences you watch "Discover Dairy and Milk Quality and Safety" video.

40	**100**	**Clean**	**Cold**	**Cool**	**Covered**
Farmers	**Hands**	**Healthy**	**Kills**	**Machines**	**Tests**

1. First, ___**farmers**___ really care about their cows

2. The whole milking process takes place using modern _____**machines**_____ without human _____**hands**___ ever touching the milk.

3. Everything is sanitized which means keeping things clean so people can stay ___**healthy**___.

4. Plate coolers quickly ____**cool**_____ the milk.

5. Milk is stored in the milk tank at _____**40**_____ degrees until it leaves the farm.

6. Before a farm's milk goes into the truck, the driver ___**tests**___ and labels the milk.

7. Pasteurization _____**kills**___ any microorganisms like bacteria, so dairy products are both healthy and pure.

8. Milk is shipped in refrigerated trucks no more than ___**100**___ miles away.

9. Our job is the three C's, keep milk __**clean**___, _**covered**__, and ___**cold**___.

Grades
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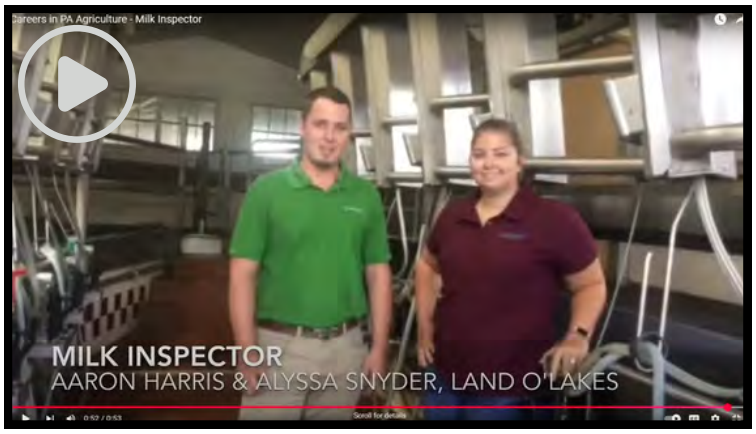
Lesson 2: Milk Quality & Safety

Career Spotlight: USDA Milk Inspector



Description

A United States Department of Agriculture (USDA) milk inspector is usually assigned to a specific territory and conducts inspections of farms at least every six months (per the Pasteurized Milk Ordinance which requires that Grade A dairy farms must be inspected twice yearly). They review the entire facility during their visit, checking cleanliness of the milking parlor equipment, examining the health of the dairy herd and collecting milk and water samples for evaluation.

Common Responsibilities

- Inspecting dairy farms to ensure that they adhere to various regulatory and food safety requirements
- Collecting samples and taking them to the lab for testing
- Issuing licenses to dairy producers
- Documenting violations
- Giving recommendations
- Compiling comprehensive reports that detail the conditions at dairy facilities

Education/Training Requirements

Bachelor's degree in Agricultural Business, Animal Science, or related major (required)

Information sourced from agexplorer.com

Grades
3rd to 5th

Lesson 2: Milk Quality & Safety
Color Explosion Lab

Introduction
Milk is tested up to 17 times before it reaches the grocery store shelf to ensure it is safe for you to drink. Milk is tested for quality and safety at the farm level, in route to the dairy processing plant, and at several points during processing. It is tested to make sure it doesn't contain any harmful contaminants and is safe to drink.

In this lab, students will simulate testing milk. Students will test how milk reacts when food coloring is added to it. It takes a special ingredient to change the color of milk.

Materials Needed
- Milk (whole and Fat-Free)
- Water
- Food Coloring
- Paper Plates or Bowls
- Dishwashing Liquid
- Cotton Swabs

Procedure
As the students complete each step, have them answer the guiding questions to record what happens in this lab experiment.

1. Together, pour water in a bowl or plate. Drop food coloring into water. Record what happened on the handout (When food color is added to water, the water changes colors.).
2. Pour whole milk in a separate bowl or plate.
3. Put 2 – 3 drops of food coloring into whole milk.
4. Dip a clean cotton swab into the food coloring in the milk.
5. Then dip the cotton swab in dishwashing detergent liquid.
6. Touch the coated swab to the food coloring in the whole milk.
7. Do not stir the milk.
8. In a separate bowl or plate, pour fat-free milk in another bowl or plate.
9. Put 2 – 3 drops of food coloring into fat-free milk.
10. Dip the other end of the cotton swab in dishwashing detergent liquid.
11. Touch the coated swab to the food coloring in the fat-free milk.
12. Record the differences between the whole milk and fat-free milk reactions.
13. Complete the rest of the questions on the lab sheet.

Name: _____ **Date:** _____

Discover Dairy and Milk Safety
Color Explosion Lab

Directions: Answer the questions below in the spaces provided.

1. What happened when you put the food coloring in the water?

_____

2. What happened when you put the food coloring in the whole milk?

_____

3. What happened when you dipped the clean cotton swab into the milk?

_____

4. What happened when you dipped the coated cotton swab into the milk?

_____

5. Why did this happen to the whole milk?

_____

6. How do you think the dishwashing determent changed the way the milk reacted to the food coloring?

_____

_____

7. Repeat the method using fat free milk. What happened when you dipped the coated cotton swab into this type of milk?

_____

_____

8. The fat-free milk had _____ (same or different) reaction as the whole milk. Why do you think this is the case?

_____

_____

9. What changes could you make to this experiment to make the milk react differently?

_____

_____

10. What other food products are made from milk?

_____

_____

Name: ANSWER KEY - Page 1 Date: _____

Discover Dairy and Milk Safety
Color Explosion Lab

Directions: Answer the questions below in the spaces provided.

1. **What happened when you put the food coloring in the water?**

   It changes the color of the water.

2. **What happened when you put the food coloring in the whole milk?**

   It stays in place and does not expand. (Nutrients like fat, protein, and calcium keep it from spreading.)

3. **What happened when you dipped the clean cotton swab into the milk?**

   It absorbs the milk and/or food coloring. Nothing really happens.

4. **What happened when you dipped the coated cotton swab into the milk?**

   The food coloring disperses quickly in circles around the milk.

5. **Why did this happen to the whole milk?**

   Answers may vary. Detergent repels fat from milk. The reaction between the detergent and the fat forms micelles, which is how detergent helps to lift grease off of dirty dishes. As the micelles form, the pigments in the food coloring get pushed around. Eventually equilibrium is formed, but the swirling of the colors continue for quite awhile after stopping.

6. **How do you think the dishwashing determent changed the way the milk reacted to the food coloring?**

   The detergent lowers the surface tension of the liquid so the food coloring is free to flow throughout the milk. The detergent reacts with the protein in milk, altering the shapes of those molecules and setting them in motion.

7. **Repeat the method using fat free milk. What happened when you dipped the coated cotton swab into this type of milk?**

   Answers may vary. Nothing happened. The cotton swab soaked in the color. The color didn't hold its shape as well.

Name: ANSWER KEY - Page 2 Date: _____

Discover Dairy and Milk Safety
Color Explosion Lab

8. The fat-free milk had *different* **(same or different) reaction as the whole milk. Why do you think this is the case?**

Fat-free milk has no fat. Whole milk has fat in it. The fat in the whole milk makes the exploding reaction with the coated swab.

9. What changes could you make to this experiment to make the milk react differently?

Answers may vary. We could use milk with different fat levels or different colored food coloring. Sour milk or contaminated milk could also change the way the milk reacts in the experiment.

10. What other food products are made from milk?

Cheese, ice cream, yogurt, butter, sour cream, cottage cheese, cream cheese, kefir, etc.

Name: _____ **Date:** _____

Lesson 2 Milk Quality & Safety
Writing Prompt

Prompt: Draw a picture to show one way you can keep milk fresh and high-quality. Then write 1 – 2 sentences explaining the 3 C's of your job in keeping milk safe to drink.

Name: _____ **Date:** _____

Lesson 2 Milk Quality & Safety
Writing Prompt

Prompt: Milk safety is a team effort. You have a part in keeping it fresh. Describe three things you can do to make sure milk remains wholesome and high-quality. Be sure to incorporate the three "C's" in your response.

Name: _____ **Date:** _____

Lesson 2 Milk Quality & Safety
Writing Prompt

Prompt: Milk safety is a team effort. You have a part in keeping it fresh. Describe three things you can do to make sure milk remains wholesome and high-quality. Be sure to incorporate the three "C's" in your response.

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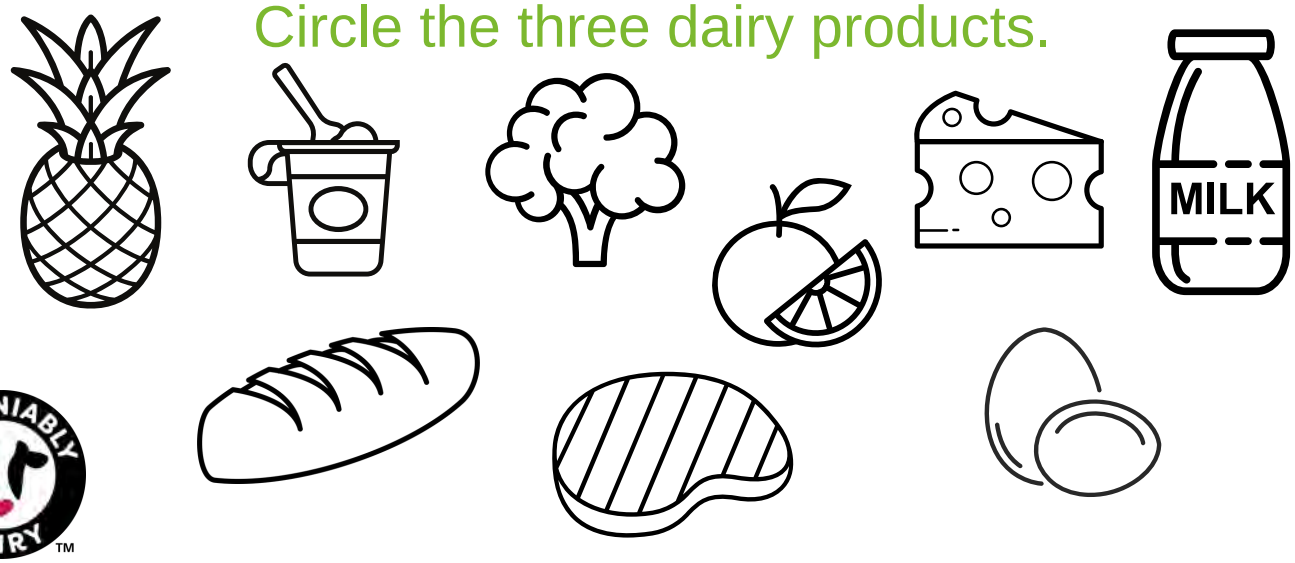
Can you find these dairy words in the word search?

Milk
Barn
Cheese
Corn
Cow
Yogurt
Heifer
Bull

P	K	S	U	K	M	Y	L	C	E
L	C	H	E	E	S	E	H	M	T
D	P	E	C	O	V	L	K	I	R
O	W	I	L	C	B	U	L	L	Y
E	E	F	C	C	N	Y	C	K	O
C	R	E	H	L	G	S	O	H	V
O	S	R	Y	O	G	U	R	T	F
W	T	T	S	L	J	U	N	G	Y
G	O	W	B	A	R	N	D	D	R
Y	D	R	K	I	N	Y	D	Y	G

You should get three servings of dairy every day!

Circle the three dairy products.



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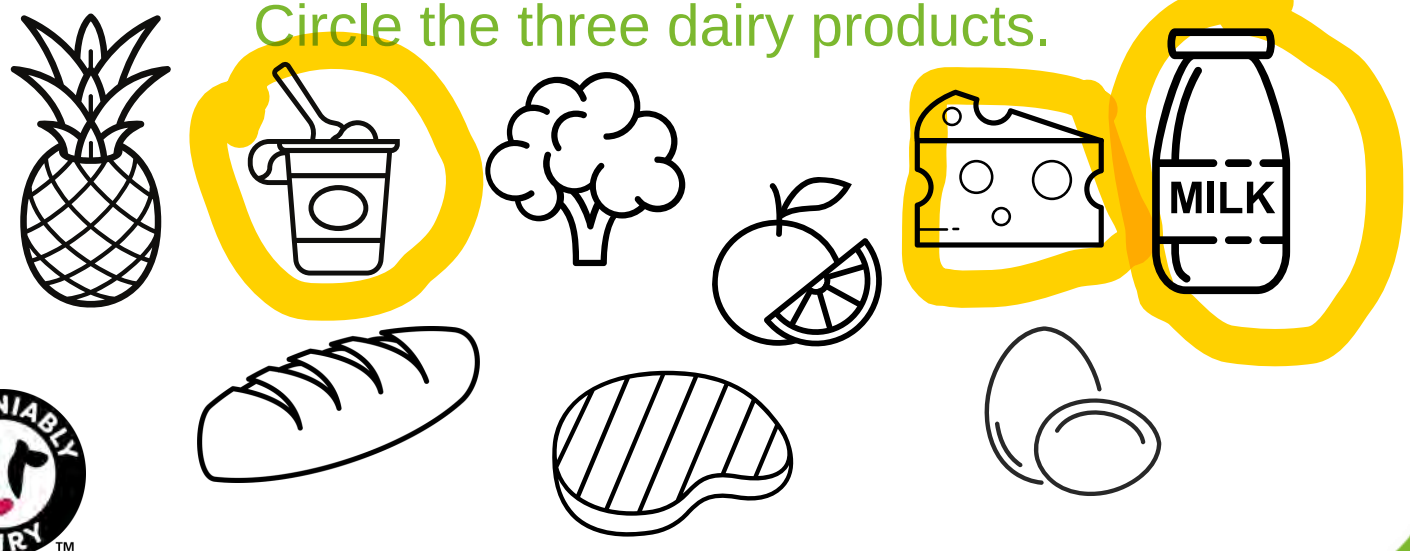

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